
Management Information Systems for Public Health Nursing Services

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MANAGEMENT INFORMATION SYSTEMS have emerged in the 1970s as a vital tool for the provision of efficient and effective patient care by public health and community health agencies. A management information system, according to one authority, is "an organized system that manages the flow of information in the proper time frame, and thus, assists the decision-making process" (1). A management information system based on a systems model collects and processes data and converts them into relevant knowledge. In essence, the function of any management information system is to provide assistance in planning, controlling, and operating an agency (2).

The traditional structure of an agency is usually in the shape of a pyramid consisting of hierarchical levels. The management information system of an agency must provide information to support all of the levels within the organizational structure (3).

A fundamental step in developing a management information system is the identification of its primary objectives in terms of the uses of the resultant system. The systems design requires the determination of the kinds of data needed to satisfy the identified system objectives. The process of creating a feasible management information system generally

has four essential steps: systems planning, systems development, systems testing and implementation, and systems management.

The design of the system should include the "feedback" process, which allows the data collector or manager of agency data to adjust and control its flow. It is important to recognize that the system should provide information that is timely for decision making (4).

Background

Traditionally, public health agencies provide little systematic documentation concerning their services. This is particularly true for public health nursing

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services, which represent the largest area of health services for most agencies. Generally, nurses' notes are incorporated into a narrative record. Statistical information is generated manually in a number of ways; for example, the peripherally punched McBee cards. Owing to the use of different admission and discharge criteria, basic information such as case-load size often is not known. Although data on time and cost expenditures are collected from an annual time-cost study, information about specific ongoing activities is not readily available.

Federal legislation since 1965 has had a great impact on public health agency information requirements. The Medicare and Medicaid programs have required specific information for reimbursement by third-party payers. Federally funded categorical programs, such as family planning, have also required specific information to justify the services rendered. When national health insurance becomes a reality, information demands will undoubtedly increase.

Management information systems have become essential in public health and community health agencies for several reasons: the need for more information for determining the quantity, quality, and cost-effectiveness of health care services; the need for agencies to receive reimbursement from third-party payers as quickly as possible; the need to provide data to satisfy requirements of Federal and State legislation; and the need to plan, control, and organize information for advancing productivity, predicting resource requirements, and arriving at meaningful program evaluations.

Public Health Nursing Modules

To satisfy the purposes just cited, four basic components called "modules" of management information systems have been devised. Each module can be a freestanding system or a part of a comprehensive management information system. They may be described as statistical information, billing, patient assessment, and community evaluation.

The statistical information module includes two types of data: visit information and patient information. This module is useful in program planning, staffing, and budgeting and in other decision-making activities of an agency. The data it produces are often used in the preparation of reports for county, State, and Federal agencies (5).

Visit information usually focuses on the nurse as a health care provider. Information is obtained about each nursing activity for a given day and incorporated into a "daily activity sheet." The patient information approach, on the other hand, focuses

on information collected on each patient on a certain day. This information is usually entered into a "report of service" form.

The billing information module facilitates the production of billing, accounts receivable, and other kinds of financial data and helps improve cash flow. This type of module may be used to combine automated billing and accounts receivable procedures with either the computerized or the manual preparation of bills. Or it can be used to capture continuous billing information relative to the ongoing services that are recorded on a daily activity report via an on-line terminal.

The patient assessment module tracks patient progress. It follows the patient from initial encounter to assessment, diagnosis, treatment, subsequent discharge, and post-discharge followup. This module was devised to use the kind of input data generated by the problem-oriented patient record—for example, the record developed by the National League for Nursing. It relies on definitions for classifying and coding interventions that are appropriate to community nursing practice.

The community health service evaluation module summarizes significant health characteristics and health status indicators of a population as a basis for auditing and evaluating the quality of an agency's nursing practice. It should provide measurement of such factors as an agency's cost effectiveness, the equity with which it distributes its services, and the long- and short-term outcomes of these services.

Study of Management Information Systems

To learn more about the status of management information systems in public health and community health nursing agencies, 58 agencies were evaluated by the Division of Nursing in the fall of 1976 (6). The 25 State and 8 local county health departments studied used the statistical information module exclusively. Moreover, the use of the visit information approach outnumbered the patient information approach by 3 to 1. On the other hand, the 25 visiting nurse associations studied routinely used the billing information module.

The official agencies used the data provided by the statistical information module to plan for staff, to prepare budgets, and to determine the types of services needed. They generated reports that described the number of visits, location, category of patients served, and type of service received according to type of provider.

The systems in the nonofficial agencies used the billing information module to generate information

on accounts receivable and accounts payable, and they provided some type of automated billing and payroll. Statistical visit information was also generated through the use of this module. It is interesting that the statistics obtained through use of the statistical and billing modules by the official and non-official agencies were essentially similar in focus but not in content.

An analysis of these existing systems also revealed a diversity of codification design. For patient classification, the majority of the systems used either the 1-digit code developed by the National League for Nursing, or a 2- or 3-digit modification of it. Several systems used adaptations of the International Classification of Diseases Adapted (ICDA) (7). Two-thirds of the 58 systems surveyed employed 2-digit codes, and the remaining used either 3- or 4-digit codes. Some systems collected data only on the patients' primary diagnoses; others, on all diagnoses recorded. The importance of diagnostic category information is underscored by the necessity for reimbursement for service by third-party payers.

Since social security numbers may no longer be used, a variety of methods of patient identification were employed by the systems surveyed. They also varied in age designation; a majority of the systems collected data in terms of age categories rather than birth date.

The patient assessment and community health service evaluation modules may not have been adopted by community health agencies because of unavailability of measures for assessing patient progress, the absence of meaningful health status indicators, and the lack of generally accepted standardized evaluation measures. It is imperative to accelerate the development and utilization of evaluation modules because of their importance in program planning and in evaluating the impact of services on the community.

Perhaps one of the most comprehensive of all existing computerized management information systems is the one developed by the Indian Health Service. This system has the capability for providing on-line information on all health care services provided to clients. The cost of such a comprehensive system, however, might well be prohibitive for a typical public health and community health agency (8).

Management Information System Projects

In recent years, the Division of Nursing of the Bureau of Health Manpower, Public Health Service, has supported several important projects in management information systems for public health nursing.

This interest evolved with the need to determine manpower requirements for public health and community health nursing practice and to evaluate the impact of this practice. A brief description of these projects follows:

Public health nursing census. This census, which began as an annual survey in 1937, is probably the oldest systematized collection of data in nursing. The census has collected information on the number and educational preparation of nurses employed for public health in the United States and its Territories. The last survey was done in 1974 and the next is planned for 1978 (9).

Patient progress. The patient progress methodology, developed in the 1960s by Roberts and Hudson of the Division of Nursing, attempted to measure the progress of a patient receiving public health nursing services. This method was a form of evaluation or audit of public health nursing practice. Patient progress was probably one of the earliest attempts to develop an information system concerned with the evaluation of nursing care of patients (10).

Rockland County project. The Rockland County Health Department in New York conducted a project in the 1960s that was aimed at computerizing data on patient progress (contract No. P.H.108-67-35 with the Division of Nursing). Data were collected by use of the patient progress methodology to develop a patient assessment system for determining staffing requirements for public health nursing. This was one of the earliest attempts to develop a computerized patient module for patient care.

Systematic nursing assessment. Standardized nursing assessment forms were prepared in the early 1970s by the School of Nursing of the State University of New York in Buffalo to determine care requirements as part of either a manual or a computerized patient information system (11). The study objectives were to:

- identify the information needed by nurses for decision making in planning patient care;
- design tools for gathering, recording, and adapting these data for use in automated information systems; and
- create a way to communicate patient information to nurses and allied health professionals in both hospital and community health agencies.

Computerized record system to store and summarize information. A computerized record system

was designed by the Community Nursing Services of Philadelphia to strengthen the planning and evaluation of community nursing care (contract No. NOI-NU-24171 with Division of Nursing). With this system, attempts were made to generate reports on identification and description of individual patients and patient populations, use of agency resources by patients, identification of health and quality assurance indicators, financial information, analysis of caseloads, activity levels, expenses, and time allocations. The system was also designed to assist in the evaluation of patient care.

Home health management information system. A computerized statistical information module for collecting essential patient information about home visiting nursing services was developed by the New Jersey State Department of Health (contract No. NOI-NU-04147 with Division of Nursing). This system has been implemented in almost all community health agencies in New Jersey. Its use is a requirement for State licensure for home health nursing.

Nursing information system. The Florida Health and Rehabilitation Services Agency is presently developing an on-line computerized nursing information system to collect not only visit information but also information on clinic and school health nursing services and activities (contract No. NOI-NU-34036 with Division of Nursing). The system will provide State and county administrators of nursing services with essential organized data that are needed to improve the management, planning, and evaluation of public health nursing activities statewide and in homes, clinics, and schools. The system has been tested and is now operating successfully in one county.

Impact of the computerized problem-oriented record on the nursing component of patient care. A project at the Medical Center Hospital of Burlington, Vt., is examining the computerized problem-oriented medical record in terms of its contribution to patient assessment and to the management of nursing care (contract No. NOI-NU-44126 with Division of Nursing). This project will assess the impact of the computer on patients and staff in a hospital and document the changes in patient care that result from the computer installation.

Problem classification scheme for public health and community health. The Visiting Nurse Association

of Omaha, Nebr., is conducting a project to produce a problem classification scheme for patient care that is appropriate to public health nursing practice (contract No. 231-75-0818 with Division of Nursing). This classification scheme is being tested to determine its ability to assess, describe, and track patient care.

National Health Planning Information Center. This Center, which resulted from the National Health Planning and Resources Development Act of 1974 (Public Law 93-641), has a nursing component. This component provides the health planning community with access to literature on planning for public health and community health nursing manpower. The huge data base of the component will allow it to provide computerized abstracts, citations, and other information concerning nursing services, resources, and planning (12).

Analysis and planning for improved distribution of nursing personnel and services. The Western Interstate Commission on Higher Education in Boulder, Colo., undertook a multipurpose project to provide a methodology for assembling information for nursing manpower planning (contract No. 231-75-0803 with Division of Nursing). The project was completed in December 1977, and it has already produced the following:

- Analytical approaches and projection models for evaluating nursing manpower resources and requirements for counties, health service areas, statewide areas, and the nation as a whole (13-15).
- A comprehensive data base relative to nursing manpower resources and requirement (16).
- A compilation of new approaches toward attaining a more equitable distribution of nursing manpower (17).
- Training manuals and guides for nursing manpower planning, including the use of information systems in such planning (18).

National League for Nursing

In addition to the projects just listed, the National League for Nursing, with Division of Nursing funding, has conducted two national conferences and five regional workshops to accelerate agency use of management information systems; several publications have resulted from these, including a guide to systems planning (19-21). Currently under preparation is a comprehensive directory of the computerized management information systems now being used in public health and community health agencies.

Legislation Affecting Data Requirements

Information requirements concerning improvement of health care delivery will continue to grow as health legislation is enacted and implemented. The National Health Planning and Resources Development Act of 1974 modified and expanded the role of areawide planning by health systems agencies. The law requires these agencies to assemble and analyze data on an area's health resources. This requirement places a new responsibility on public health and community health agencies. It calls for them to work together with health systems agencies to establish data systems that are responsive to the planning activities of health systems agencies. The Nurse Training Act of 1975 (Public Law 94-63) also encourages the systemization and computerization of information on nurse manpower supply, distribution, and requirements by the Federal Government in order to submit annual reports to Congress concerning these areas.

Conclusions

Public health and community health agencies nationwide are an important source of patient information, and their responsibilities in this area will continue to increase. Experience has shown how much needs for data have increased with the adoption of the Medicare and Medicaid programs. Agencies must now prepare to systematize data collection in response to the possibility of national health insurance, which undoubtedly will make additional demands for information (21).

Management information systems can serve to meet the increasing demands for information. The use of such systems can produce the following benefits: (a) reduce the number of people needed to develop statistical and management reports and to prepare financial information on billings for patient services, (b) improve cash flow, (c) reduce the amount of professional staff time spent in paperwork, (d) identify significant trends in the use of services, (e) assist in program planning and budgeting, (f) test the validity of ongoing programs, (g) identify new community needs, and (h) evaluate the impact of nursing practice.

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